



# **Printed Wiring Board Cleaner Technologies Substitutes Assessment: Making Holes Conductive**

## **Volume 1**

### **Design for the Environment Printed Wiring Board Project**

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This document was produced under EPA Grant # CX823856 from  
EPA's Environmental Technology Initiative Program



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## For More Information

To learn more about the Design for the Environment Printed Wiring Board Project, or to obtain other related materials, please contact:

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Or visit the Design for the Environment Printed Wiring Board Project Web site at:

<http://www.ipc.org/html/ehstypes.htm#design>

For more information about the Design for the Environment Program, visit the Design for the Environment Program Web site at:

<http://www.epa.gov/dfe>

The web site also contains the document, *Cleaner Technology Substitutes Assessment: A Methodology and Resources Guide*, which describes the basic methodology used in this assessment.

To learn more about the University of Tennessee Center for Clean Products and Clean Technologies, visit the Center's Web site at:

<http://eerc.ra.utk.edu/clean/>

## Acknowledgments

This document was prepared by the University of Tennessee (UT) Knoxville Center for Clean Products and Clean Technologies and the PWB Engineering Support Team with assistance from numerous UT students and staff. The authors would like to acknowledge the outstanding contributions of **Chad Toney, Nayef Alteneh, Scott Brown, Sittichai Lertwattanakarak and Yatesh Midha**, M.S. Candidates in Industrial Engineering, who helped design and perform the cost analysis in Section 4.2; **Catherine Wilt**, UT Center for Clean Products and Clean Technologies, who researched and wrote the Regulatory Status section (Section 4.3); and **Margaret Goergen**, UT Center for Clean Products and Clean Technologies, who was the document production manager.

Valuable contributions to the project were provided by the project's Core Group members, including: **Kathy Hart**, EPA Project Lead and Core Group Co-Chair; **Christopher Rhodes**, Institute for Interconnecting and Packaging Electronic Circuits, Core Group Co-Chair; **Debbie Boger**, EPA Technical Lead and Technical Workgroup Co-Chair; **John Lott**, DuPont Electronics, Technical Workgroup Co-Chair; **Michael Kerr**, Circuit Center, Inc., Communication Workgroup Co-Chair; **Gary Roper**, Substrate Technologies, Inc., Implementation Workgroup Co-Chair; **Greg Pitts**, Microelectronics and Computer Technology Corporation; **John Sharp**, Teradyne Connection Systems; **Steve Bold**, Continental Circuits Corporation; and **Ted Smith**, Silicon Valley Toxics Coalition.

We would like to acknowledge **Bill Birch** of PWB Interconnect Solutions, Inc., and **Susan Mansilla** of Robisan Laboratory, Inc., for their work in planning, conducting testing for, and writing a technical paper presenting the results of the making holes conductive performance demonstration. Recognition is also given to **ADI/Isola** who supplied the materials for the performance demonstration, and to **H-R Industries, Inc.** and **Hadco Corporation** for volunteering their facilities to build and electroplate the boards. Performance demonstration contractor support was provided by Abt Associates, Inc., of Cambridge, MA, under the direction of **Cheryl Keenan**.

The following members of the U.S. Environmental Protection Agency (EPA) Design for the Environment (DfE) Staff and the EPA Workgroup provided direction and staff support for this project.

### EPA Design for the Environment Staff

Kathy Hart	Bill Hanson
Debbie Boger	Joe Breen
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## **EPA Risk Management Workgroup**

We would like to express appreciation to the EPA Risk Management Workgroup, who provided valuable expertise in the development of the CTSA and provided comments on project documents.

Sid Abel	Terry O'Bryan
Susan Dillman	Daljit Sawhney
Gail Froiman	John Shoaff
Susan Krueger	Tracy Williamson
Dave Mauriello	

## **Participating Suppliers**

We would like to thank the suppliers for their participation in the Design for the Environment Printed Wiring Board Project. In addition to supplying critical information regarding the various technologies, these companies also made significant contributions in planning and conducting the performance demonstration. The participating suppliers are listed below.

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## **Performance Demonstration Sites**

We would like to recognize the twenty-six test sites that volunteered the use of their facilities for the performance demonstration, and thank them for their commitments of resources and time. We also appreciate the assistance they provided in gathering data necessary for the preparation of this document.

Altron, Inc.

Hadco Corporation

Bureau of Engraving, Inc.

LeaRonal, Inc.

Circuit Connect, Inc.

M-Tek/Mass Design, Inc.

Circuit Science, Inc.

MacDermid, Inc.

Circuit Center, Inc.

Metalex GmbH

Cray Research, Inc.

Nicolitch S.A.

Details, Inc.

Omni-Circuits, Inc.

Dynacircuits Manufacturing Co.

Poly Print GmbH

Electronic Service and Design

Pronto Circuit Technologies

GCI, Inc.

Sanmina Corporation

GE Fanuc Automation

Schoeller & Co. Elektronik GmbH

Graphic Products, Inc.

Sigma Circuits, Inc.

Greule GmbH

Texas Instruments Printed Circuit Resources

## Technical Workgroup

We appreciate the industry representatives and other interested parties who participated in the Printed Wiring Board Project Technical Workgroup, and provided comments on the individual modules of the CTSA. Many thanks to the members of this workgroup for their voluntary commitments to this project.

Martin Bayes  
Shipley Company

Bill Birch  
PWB Interconnect Solutions, Inc.

Robert Boguski, Jr.  
Apogee Engineering, Inc.

Mike Boyle  
Atotech U.S.A., Inc.

Eric Brooman  
Concurrent Technologies Corporation

Michael Carano  
Electrochemicals, Inc.

Thomas Carroll  
Hughes Aircraft Company

Alan Cash  
Northrop Grumman Corporation

Nitin Desai  
Motorola, Inc.

David Di Margo  
Phibro-Tech, Inc.

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Teledyne Systems Company

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Ted Smith  
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C. Edwin Thorn  
Electrochemicals, Inc.

Jane Tran  
Orange County Sanitation District

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MacDermid, Inc.

James Zollo  
Motorola, Inc.



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## ACRONYMS

ABC	activity-based costing
ADD	average daily dose
AsF	assessment factor
AT	averaging time
ATSDR	Agency for Toxic Substances and Disease Registry
BOA	bill of activities
BCME	bis-chloromethyl ether
Btu	British Thermal Units
BW	body weight
CAA	Clean Air Act
CC	concern concentration
CEB	Chemical Engineering Branch
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CTSA	Cleaner Technologies Substitutes Assessment
CuSO <sub>4</sub>	copper sulfate
CWA	Clean Water Act
DEC	Digital Equipment Corporation of Canada
DfE	Design for the Environment
ED	exposure duration
EDTA	ethylenediaminetetraacetic acid
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
FTE	full-time employee equivalent
g	gram
gal	gallon
GI	gastro intestinal
gpm	gallons per minute
H <sub>2</sub> SO <sub>4</sub>	sulfuric acid
HASL	hot air solder leveling
H <sub>c</sub>	Henry's Law Constant
HEAST	Health Effects Assessment Summary Tables
HQ	hazard quotient
HSDB	Hazardous Substances Data Bank
IARC	International Agency for Research on Cancer
IPC	Institute for Interconnecting and Packaging Electronics Circuits
IRIS	Integrated Risk Information System
ISCLT	Industrial Source Complex - Long Term
IST	Interconnect Stress Test
KUB	Knoxville Utility Board
kW	kilowatt
LADD	lifetime average daily dose
LEPC	Local Emergency Planning Commission
LOAEL	lowest-observed-adverse-effect level

MACT	maximum achievable control technology
MCC	Microelectronics and Computer Technology Corporation
MHC	making holes conductive
MnO <sub>2</sub>	manganese dioxide
MOE	margin of exposure
MSDS	material safety data sheet
MTL	Master Testing List
MW	molecular weight
NCP	National Contingency Plan
NIOSH	National Institute for Occupational Safety and Health
NOAEL	no-observed-adverse-effect level
NPDES	National Pollutant Discharge Elimination System
NPDWR	National Primary Drinking Water Regulations
NSDWR	National Secondary Drinking Water Regulations
NTP	National Toxicology Program
OEM	original equipment manufacturer
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PDR	potential dose rate
POTW	publicly-owned treatment work
PPE	personal protective equipment
psi	per square inch
PTH	plated-through holes
PWB	printed wiring board
RCRA	Resource Conservation and Recovery Act
RfC	reference concentration
RfD	reference dose
RTECS	Registry of Toxic Effects of Chemical Substances
RQ	reportable quantity
SARA	Superfund Amendments and Reauthorization Act
SAT	Structure-Activity Team
SDWA	Safe Drinking Water Act
SERC	State Emergency Response Commission
SF	slope factor
SIC	standard industrial code
SO <sub>x</sub>	sulfur oxides
SPC	statistical process control
ssf	surface square feet
TMCR	Technology Market Research Council
TPY	tons per year
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
TWA	time-weighted average
UT	University of Tennessee
UR	utilization ratio
VOC	volatile organic compounds
WOE	weight-of-evidence